



Department of Pesticide Regulation



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MEMORANDUM

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SUBJECT: ANALYSIS OF METHYL BROMIDE WORKSITE PLANS

Background

The Department of Pesticide Regulation is currently reviewing methods for developing buffer zones with the objective of mitigating off-site exposure to fumigants. One method for fumigants with a 24-hour threshold averaging time, proposed by Arvesta for iodomethane, includes the fundamental assumption that it is unlikely a person would spend 24 hours at the perimeter of a buffer zone. Under this assumption it is argued that any buffer zone selected from the distribution of buffer zones developed based upon the single direction to maximum 24-hour concentration will be longer than necessary. The Arvesta proposed alternative method to develop the distribution of buffer zones uses transects in all directions surrounding an application over a 24-hour period. Under this procedure, the single transect in the maximum 24-hour concentration direction on each day will likely have little influence in the resulting the distribution of buffer zone lengths relative to the many other transects in the remaining directions. Thus, the transects in the maximum 24-hour concentration direction will have little influence in the final implementation of the buffer zones. Arvesta states that its proposed procedure to develop the distribution of buffer zone lengths will “. . . set buffer zone based upon minimizing the individual probability of any location at the edge of the buffer zone, in any direction from the field, has a concentration greater than the threshold.” However, this proposed method is only valid if there is in practice a low probability of residences, and/or other sensitive sites being located close to the buffer zone.

California requires permits for the use of methyl bromide and, as part of this permit, a site plan must be submitted. The site plan documents location of sensitive sites near the buffer zone. The site plan describes a proposed application. The application so described may or may not eventually be made. Any fumigant proposed as a methyl bromide replacement will likely have use patterns similar to methyl bromide. This memorandum presents and analyzes fumigation site plan data collected from three counties in California where methyl bromide use is common. The objective of this analysis is to investigate whether it is reasonable to assume it is unlikely that sensitive areas are near the buffer zone.



Data Collection

In August 2004, the Environmental Monitoring Branch staff traveled to the county agricultural commissioner offices in Monterey, Santa Barbara, and Ventura Counties to gather data concerning proximity of sensitive sites to methyl bromide applications. Methyl bromide site plans were chosen at random from available site plans at each office with the following sample sizes: (1) Monterey County n=93, (2) Santa Barbara County n=31, and (3) Ventura County n=187. No formal sampling scheme was employed. This should be kept in mind when interpreting these results. However, no particular type of site plan was targeted for inclusion in this sampling procedure. Site plan files were simply randomly selected from shelves in each county agricultural commissioner office.

Statistical Analysis

The data were entered into a spreadsheet with the following fields:

(1) county, (2) year, (3) permit number, (4) site, (5) block, (6) acres, (7) map number, (8) number of sensitive sites between the inner and outer buffer zone, (9) number of sensitive sites within 50 feet of the outer buffer zone, (10) flags for sites with adjacent agricultural land, (11) proposed application date on the permit, (12) MTRS, (13) application method, (14) crop, and (15) flags to indicate whether a Pesticide Control Operator (PCO) performed the application.

Data fields suitable for statistical analysis were county, acres, number of sensitive sites within 50 feet of the outer buffer zone, application method, and whether the application was performed by a PCO. Number of sensitive sites between the inner and outer buffer zone was not used because these sites were vacated for the duration of the buffer zone requirement.

Four flags were created to facilitate grouping and analysis:

(1) county index, (2) an index for size categories based upon number of sensitive site within 50 feet of the outer buffer, (3) an application method index, and (4) an index for whether or not a PCO conducted the application. The index values are shown in Table 1 (attached).

All statistical analysis was conducted using MINITAB (MINITAB, 1998). Graphical presentations and data summaries are used to characterize associations between applications and sensitive sites. Nonparametric summary statistics were used to characterize variables where appropriate. Nonparametric statistics include the median and the inter-quartile range (the range between the 25th and the 75th percentiles of observations).

Results

A total of 411 permit site plans were examined: 380 site plans included information about the presence or absence of nearby sensitive sites, 31 did not. It cannot be assumed that the 31 sites with no information had no sensitive sites nearby. It is impossible to evaluate whether sensitive sites were near these proposed applications so the 31 site plans with no information on sensitive sites were omitted. Of the 380 site plans with information, 303 showed no sensitive sites within 50 feet of the outer buffer zones, 66 showed 10 or less residences, 9 site plans showed greater than 10 residences (up to 50 or more), and 2 sites showed only high schools (no residences listed). Therefore, 20.3% of the sampled site plans showed either residences or high schools within 50 feet of the outer buffer zone. Removing the two site plans that showed high schools but no residences, 19.7% of the sampled site plans showed at least one residence within 50 feet of the outer buffer zone. Residences are sensitive sites where it can be assumed some people are present 24 hours a day. By county (Table 2, attached) 27.4%, 8.9%, and 23.7% of site plans show residences within 50 feet of the outer buffer in Monterey, Santa Barbara, and Ventura Counties, respectively.

The distribution of application sizes on the site plans from the three counties is shown in Figure 1 (attached). In Monterey County the median application was 12 acres and there was one application of 39 acres as the largest. Applications in Monterey County were most frequently between 4 and 20 acres (73 of 93 applications on the site plans). The inter-quartile range for Monterey County was 9 acres. In Santa Barbara County the median application was 9 acres with one application at 26 acres as the largest. The vast majority of the applications in Santa Barbara County were less than 20 acres (120 of 127 applications on the site plans). In addition, the inter-quartile range was the smallest in Santa Barbara County at 6.8 acres. Ventura County showed the widest variation in field sizes with the median application at 9.5 acres, 87 applications less than 10 acres, but 13 applications of 40 acres. The inter-quartile range for Ventura County was the largest at 16 acres, reflecting the wide variation in application sizes on the site plans. However, in all counties the majority of the applications were less than 20 acres.

Figure 2 (attached) shows, for all three counties pooled together, the relationship between the number of sensitive sites within 50 feet of the outer buffer and the size of the application on the site plan. Figure 2 illustrates that while the range of sizes of the 20% of applications with at least one sensitive site is large, applications with greater than 10 sensitive sites nearby tend to be less than 20 acres. Figure 3 (attached) shows the same relationship but within each county. Monterey and Ventura County have between them all of the applications with 10 or more sensitive sites. The higher frequency of larger applications (13 applications of 40 acres) and the large inter-quartile range in Ventura County applications is evident in Figure 3.

Table 3 (attached) shows that the majority of the site plans show that PCO's will make the application (74.2%). With the exception of deep/broadcast/non-tarp method, the percentage listed as PCO applied differs little with application method. There were only 2 deep/broadcast/non-tarp applications among the sampled site plans, both listing a PCO as the applicator. Although there were a small number of site plans with greater than 10 sensitive sites within 50 feet of the outer buffer boundary, the majority of those site plans (7 of 11) list a non-PCO as the applicator, e.g., the grower.

Summary

This analysis found that approximately 20% of methyl bromide application site plans showed at least one sensitive site within 50 feet of the outer buffer zone boundary. The median application size on the site plan was smallest for Santa Barbara County (9.0 acres), largest for Monterey County (12.0 acres). However, Ventura County, with a median application size of 9.5 acres, showed the widest variation in application sizes with an inter-quartile range of 16.0 acres and 13 applications of 40 acres.

Approximately 75% of site plans list a PCO as the applicator. However, for sites plans showing greater than 10 sensitive sites, the majority lists a non-PCO, e.g., the grower, as the applicator.

These results indicate that it is relatively common to have sensitive sites, such as homes or schools, within 50 feet of the outer buffer boundary of a methyl bromide application. Therefore, in practice there is a reasonable probability of residences and/or other sensitive sites being located close to the buffer zone. The fact that residences are within 50 feet of the outer buffer boundary in approximately 20% of application site plans invalidates the fundamental assumption that it is unlikely a person would spend 24 hours at the perimeter of a buffer zone. It follows that buffer zones developed from the distribution of buffer zones developed based upon the single direction to maximum 24-hour concentration will not be longer than necessary.

Attachments

bcc: Barry Surname File (w/Attachments)

Randy Segawa
February 10, 2005
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References

MINITAB. 1998. User's Guide 2: Data analysis and quality tools. Release 12.1 for Windows®.
MINITAB Statistical Software.

Table 1. Category indices used for statistical analysis of the collected methyl bromide site plans.

Field	Value	Flag
County		
	Monterey	0
	Santa Barbara	1
	Ventura	2
#Sensitive sites $\leq 50\text{ft}$		
	0	0
	$0 < \# \leq 10$	1
	$10 < \#$	2
	High school only	3
Application Method		
	Shallow/broadcast/tarp	0
	Deep/broadcast/non-tarp	1
	Bed/tarp	2
	Hot Gas	3
PCO Applied		
	No	0
	Yes	1

Table 2. Site plan applications tallied by county and category of sensitive site.

	Sensitive Sites				
County	None	≤ 10	> 10	High School only	Total
Monterey	61	21	2	0	84
Santa Barbara	112	11	0	0	123
Ventura	130	34	7	2	173
Total	303	66	9	2	380

Table 3. Site plan applications tallied by application type and by non-Pest Control Operator versus Pest Control Operator applications.

Application Type	PCO Applied		
	No	Yes	Total
Shallow/Broadcast/Tarp	80	197	277
Deep/Broadcast/non-Tarp	0	2	2
Bed/Tarp	13	58	71
Hot Gas	5	25	30
Total	98	282	380

Table 4. Site plan applications tallied by sensitive site category and non-Pest Control Operator versus Pest Control Operator applications.

Sensitive Sites	PCO		Total
	No	Yes	
None	74	229	303
≤ 10	16	49	65
>10	5	4	9
High School Only	2	0	2
Total	97	282	379

Figure 1. Size distribution of methyl bromide applications by county.

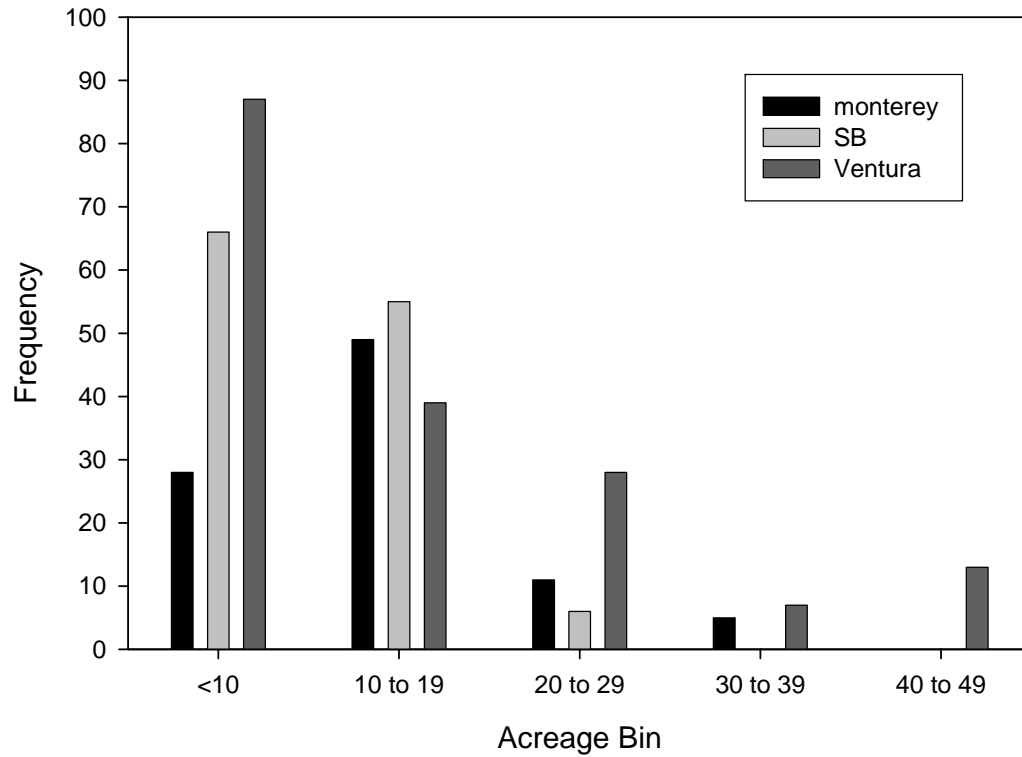


Figure 2. Number of sensitive sites within 50 ft of the outer buffer zone boundary versus application size for site plans pooled over the three counties (Monterey, Santa Barbara, and Ventura).

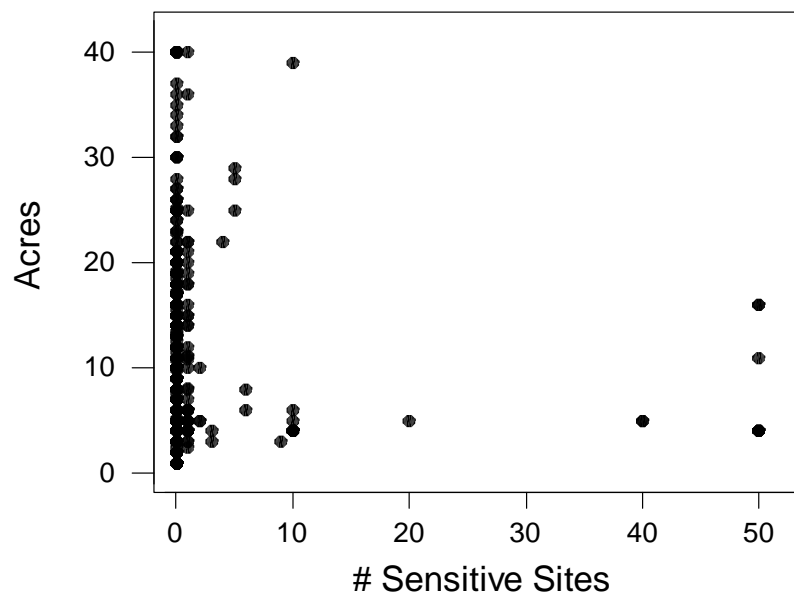


Figure 3. Number of sensitive sites within 50 ft of the outer buffer zone boundary versus application size for site plans shown for each county separately.

